

CLAIMS

1. A method of encoding speech comprising the steps of:
formulating a speech signal from utterances spoken by a speaker;
determining an estimate of periodicity from the formulated signal;
5 modifying the formulated signal using the periodicity estimate such that the
periodicity is improved; and
encoding the modified signal in a speech encoder.
- 10 2. A method according to claim 1 wherein the formulated speech signal is a digitized
signal such as a residual signal produced from a coding algorithm such as Linear
Predictive Coding (LPC) or the actual speech signal itself.
- 15 3. A method according to claim 1 wherein the determining an estimate of periodicity
step comprises obtaining a normalized pitch cycle by autocorrelation.
4. A method according to claim 3 wherein the modifying step includes normalizing
the pitch by shifting the time domain discrete values of the residual signal to
conform to the normalized pitch cycle.
- 20 5. A method according to claim 4 wherein the modifying step further comprises the
speech signal being upsampled by interpolation such that suitable discrete values
of the upsampled signal are shifted to conform to the average pitch cycle.
- 25 6. A method according to claim 1 wherein a pitch scaling algorithm such as Time
Domain Pitch Synchronous Overlap-Add (TD-PSOLA) is used to normalize the
pitch cycle lengths in an analysis frame.
7. A method according to claim 5 wherein the modified signal is down sampled prior
to encoding in the speech coder.

8. An apparatus for generating a modified signal suitable for use with an speech encoder/decoder comprising:

means for formulating a speech signal from utterances spoken by a speaker;
means for determining an estimate of periodicity from the formulated signal;
5 means for modifying the formulated signal using the periodicity estimate such that the periodicity is improved; and
means for encoding the modified signal in the speech encoder/decoder.

9. An apparatus according to claim 8 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

10. An apparatus according to claim 8 wherein the apparatus includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.

11. An apparatus according to claim 8 wherein the apparatus is integrated into a mobile device.

12. A mobile device comprising:

a speech coder;
means for formulating a speech signal from utterances spoken by a speaker;
means for determining an estimate of periodicity from the formulated signal;
means for modifying the formulated signal using the periodicity estimate
25 such that the periodicity is improved; and
means for encoding the modified signal in the speech coder.

13. A mobile device according to claim 12 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

14. A mobile device according to claim 12 wherein the mobile device includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.

- 5 15. A network element comprising:

means for formulating a speech signal from utterances spoken by a speaker;
means for determining an estimate of periodicity from the formulated signal;
means for modifying the formulated signal using the periodicity estimate such that the periodicity is improved; and
10 means for encoding and decoding speech signals using the modified signal.

16. A network element according to claim 15 integrated into a radio base station functioning within a wireless telecommunication network.

- 15 17. A network element according to claim 15 wherein the formulating means includes software operating with a signal processor that is capable of generating a residual signal from a speech signal.

- 20 18. A network element according to claim 15 wherein the mobile device includes a memory comprising a software operating with a signal processor for providing means for transforming, estimating, and modifying the speech signal.